There are three distinct, uncolored tridimensional forms. The first is half fan-like in shape, lying almost entirely to the left of the mental point of regard, and includes the numbers from 1 to 100. The second includes the names of eight days, from Sunday to Sunday. The third has the names of the twelve months from January to December. The paper pointed out the elements which must appear in any theory of the genesis of the phenomena to which this group belongs.

CHARLES H. JUDD,
Secretary.

CURRENT NOTES ON PHYSIOGRAPHY.

WESTERN NEBRASKA.

A REPORT on the geology and water resources of the westernmost twelfth of Nebraska, by N. H. Darton (19th Ann. Rept. U. S. Geol. Survey, pt. IV., 1899, 721–785, numerous maps and illustrations), presents a very clear picture of an interesting region. The inter-stream areas are generally plateau-like uplands of Tertiary strata, retaining something of their initial smoothness of surface over considerable distances. The sand-hill area of mid-western Nebraska extends west into the broad upland between the North Platte and the Niobrara, where some east-flowing streams are lost. The chief valleys, that of the North Platte being the largest, are cut by streams whose courses seem to be consequent on the general easterly slope given to the region when it was uplifted. Numerous branch streams of unsystematic (insequent) arrangement dissect the valley sides, often producing characteristic bad-lands. The insequent dissection has gone so far between North Platte river and Pumpkinseed creek as to reduce an upland to a narrow ridge with numerous lateral spurs. Pine ridge, trending east and west near the northern border, is the strongest relief in the State; it is a cuesta-like upland whose escarpment is carved into bad-lands by its obsequent streams which descend northward to a denuded area of Cretaceous strata that border the southern flank of the Black hills. The present relation of ground water, springs and streams to a structure and form are well set forth in the later pages of the report. The same author contributes a brief account of the Bad Lands of South Dakota and Nebraska to the September number of the *National Geographic Magazine.*

Mention may be made in this connection of an article by W. D. Matthew on the interpretation of the White river Tertiary strata of Nebraska and South Dakota as an æolian instead of as a lacustrine formation (*Amer. Nat.*, xxxiii., 1899, 403–408).

THE MISSISSIPPI AND MISSOURI RIVERS.

THE annual reports of the commissions on our two greatest rivers (Apps. WW and XX., chief of engineers, United States Army, Washington, 1899) contain a large amount of interesting matter, whose discovery would be much facilitated if the reports were edited with more consideration for their readers. Hundreds of pages without adequate tables of contents and with unchanged page headings make the use of the reports difficult. Numerous measured sections of the Mississippi lead to the conclusion that if the banks are properly revetted to prevent erosion, while levees on the adjacent floodplain restrain the spread of high waters, the channel will be deepened and its capacity to discharge floods increased. The Yazoo basin has 310 miles of levees to protect 7100 square miles of surface. Much money has been spent on the levees by local authorities, and yet it is estimated that the volume of the levees must be increased by more than half in order to bring them up to the proper size. $20,000,000 will be needed to complete the entire levee system; over $2,000,000 having been spent in 1899. The heights of floods, their progress down the river, the locations of levees and areas of overflow are shown on various plates and maps. Besides a new edition of the famous eight-sheet map of the lower Mississippi, a four-sheet map of the upper part of the river was issued during the past year on a scale of 1 : 316,800. No relief is indicated except along the borders of the floodplain, but this suffices to suggest that the valley is the work of a larger river than that now flowing in it; not merely because the valley is wider than the river, but because the curvature of the valley is of a larger pattern than the present river seems capable of producing. The narrow postglacial rock-walled channel just above Keokuk

is well shown in relation to the broader valley up and down stream. Five new sheets of the detailed charts, 1:20,000, were issued during the year.

The report on the Missouri announces that it is impracticable to attain permanently useful results in controlling the river at the present rate of expenditure; $317,000 having been spent on river corrections during the year. Along with numerous maps representing various engineering works, the report contains a large number of excellent photographs illustrative of different methods of protecting the river banks, from which an excellent idea of the appearance of the river and of the works undertaken upon it can be gained. A series of detailed charts covering the river from its mouth to Kansas City (400 miles) on a scale of five inches to a mile with five-foot contours, have been drawn but not yet published.

GLACIAL LAKE OUTLETS IN MICHIGAN.

THE 'thumb' of Michigan, enclosing the Saginaw bay branch of Lake Huron on the southeast, is of moderate altitude, yet sufficient to have divided two lobes of the ice sheet of the last glacial epoch, which deposited their interlobate moraines along the axis of the thumb. During the retreat of the ice, the depressions evacuated by these lobes were occupied by lakes; the southeastern by Lake Maumee, overflowing through the outlet past Fort Wayne, long ago described by Gilbert; the northwestern by Lake Saginaw, whose outlet was through the Grand river channel, a magnificent ancient river bed, a mile wide, fifty miles long and sometimes cut over 200 feet deep in the drift. Further retreat of the ice uncovered a point on the crest of the thumb of less altitude than the Fort Wayne outlet; then the southeastern lake drained across the thumb to the northwestern lake, the connecting river carving the Ubly channel, which follows the outer base of an interlobate moraine. The channel is twenty miles long, a mile wide, and from 20 to 100 feet deep. At its southeastern end, its level agrees with that of the shore lines of the lake that it drained; its bed is strewn with bars of gravel and sand, indicating a flow from southeast to northwest; its further end opens upon a delta-like body of gravel at the level of Lake Saginaw. Like the ice-border channels near Syracuse, N. Y., discovered by Gilbert, or those of north Germany recently summarized by Keilhack, the Ubly channel is a geographical feature of marvellous significance in connection with the glacial theory; the interpretation of this excellent example being due to Taylor, in whose admirable series of independent studies it constitutes but one of many items (Ice dams of Lakes Maumee, Whittlesey and Warren, *Amer. Geol.*, xxiv., 1899, 6–38, maps).

CHICAGO AND ITS ENVIRONS.

THE first Bulletin of the Geographic Society of Chicago contains an essay on the 'Geography of Chicago and its Environs' by Salisbury and Alden (pp. 64, 30 figs.). A relief plate as frontispiece shows very clearly the smooth floor of the ancient expanded lake rising towards the rolling uplands through which the lake outlet cut its broad and well-defined channel. The text describes the several physiographic areas, with special reference to the successive stages of the falling lake, of which three are recognized (Glenwood, Calumet, Tolleston). The dunes of the ancient beach ridges that curve around the southern end of Lake Michigan, familiar objects to travelers by rail from the east, are mapped and described.

W. M. DAVIS.

CURRENT NOTES ON METEOROLOGY.

COMPENSATION IN WEATHER.

THE question of seasonal forecasts is considered in the Annual Summary for 1899 of *Climate and Crops: Colorado Section.* The temperature and precipitation data for Denver during the past 28 years have been compiled in order to bring out whatever relation successive seasons bear to one another, in the hope of throwing some light upon the so-called theory of compensation in weather. This theory, stated in a few words, is that a season with an excess or defect of temperature or precipitation is followed by compensating conditions in the succeeding season. The records show that the temperature for a season, or a longer period, furnishes no certain index of the conditions to be expected during the coming season. An ex-